(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 026 961**
B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication of patent specification: 21.03.84

(51) Int. Cl.³: B 07 B 1/46

(21) Application number: 80300640.2

(22) Date of filing: 04.03.80

(54) Screen element and screen module comprising such element.

(30) Priority: 06.10.79 GB 7934767

(43) Date of publication of application:
15.04.81 Bulletin 81/15

(46) Publication of the grant of the patent:
21.03.84 Bulletin 84/12

(84) Designated Contracting States:
AT BE CH DE FR GB IT LU NL SE

(56) References cited:
DE - A - 1 758 860
DE - A - 2 754 374
DE - A - 2 808 940
FR - A - 2 370 527
FR - A - 2 380 080
GB - A - 1 458 932

(73) Proprietor: Spiller, Clifford Michael
The Smithy
Burghwallis Doncaster DN6 GJN (GB)

(72) Inventor: Spiller, Clifford Michael
The Smithy
Burghwallis Doncaster DN6 GJN (GB)

(74) Representative: Dodd, David Michael et al,
ROYSTONS 531 Tower Building Water Street
Liverpool L3 1BA (GB)

EP 0 026 961 B1

Courier Press, Leamington Spa, England.

Screen element and screen module comprising such element

This invention relates to screening, and in particular to sieve screens produced by connecting together a plurality of sieve elements. Such screens are used in screening machines for dewatering, grading and the like.

It is known to cast an individual sieve element in a standard size as a mesh of polymeric material having apertures of a required shape and size. The mesh is often reinforced by the incorporation of inelastic material during casting.

A plurality of such sieve elements are then bonded together to provide a sieve screen of desired overall dimensions which is then fitted over a support frame in the screening machine.

I have previously proposed and it is known that such sieve elements have complementary adjacent edge formations to interengage one with the other and for those edge formations to accommodate an elongate interlocking member passing through and bonded in a channel therethrough. In particular, I have suggested that the channel is open to one side, namely the under or downstream side, of the elements freely to accept a said elongate interlocking member subsequently bonded therein, say by filling the unoccupied channel section with the material of the screen elements or a bonding or potting material compatible therewith.

Another proposal for screen elements, see FR—A—2 380 080, has an elongate interlocking member passing through edge portions of screen elements.

It is an object of this invention to provide an interlocking arrangement that will improve security and ease of fitment.

FR—A—2 380 080, shows a screen element moulded from synthetic polymeric material having at opposed edges thereof outwardly spaced extensions in a castellated manner and staggered one relative to the other so that, with adjacent interlocation of two screen elements, the extensions snugly interfit, and the extensions comprising a channel adapted to receive an elongate interlocking member for securing adjacent screen elements together and the channel having an inner part within which the elongate interlocking member is accommodated such as to make locating contact with the inner part at least at one side thereof when the screen elements are secured together and an outer part through which the elongate interlocking element passes into the inner part and which is of less width than the elongate interlocking element to permit snap-in fitting and retention thereof. The screen element of the present invention is of such a type and is characterisad in that, with the extensions of adjacent screen elements snugly interfitted and prior to insertion of the elongate interlocking element the outer parts of the channels of adjacent extensions are aligned when the inner parts are offset.

In one preferred embodiment, the channel cross-section is of generally key-hole shape and its outer part may be divergent sided towards the said element side but usually with a terminal spacing less than the width of the interlocking member.

In another preferred embodiment, the channel cross-section is oblong to take a correspondingly shaped rod or bar, preferably with retention lips only to one side, the inner, of projections from the sieve elements to engage in the edge of the rod or has alternately from one side and the other.

Compared with my own above mentioned proposals, there is then no need for filling of unoccupied channel section space in order to achieve a desired positive and secure interlocking, and with a minimum interruption of smooth and continuous surface across joints between adjacent screen elements. Advantages also arise in relation to peripherally bounded through-holes for interlocking members in that work space is not required for insertion of such members from one side, especially where those members are substantially rigid as is usual, and in that a closer than sliding fit can be provided between the members and the inner parts of the channels, even to the extent of obtaining a gripping contact by reason of the resilience of the screen material and very close tolerancing, even slight undersizing, of the inner part cross-section at least as to width and relative to the interlocking member, but not such as to risk distortion of the elements. There is also at least the possibility of individual element removal and replacement by knocking off and on.

There is also at least a small saving on width of the interengaging parts of the screen elements due to the absence of any requirement for clearance fitting of the interlocking member in its accommodating channel, and a substantial facilitation of obtaining touching tight fit of adjacent screen edge parts, especially if resilience of the material of the screen elements is relied upon as above, and by slight misalignment of the channel inner parts in the interlocking parts of respective ones of the screen elements. Again, element distortion is however, to be avoided.

Width saving between adjacent elements is further enhanced by the use of a preferred interlocking element of so-called wedge wire having a relatively narrow wedge-like section with its tapering convergent sides increased in convergence rate close to its narrow edge. Presentation of that narrow edge to the outer channel part also greatly facilitates insertion of the interlocking element bodily from the side of the elements through the relatively restricted outer channel part. At least as much advantage is gained from my other preferred flattish rod or bar.

I have referred to width saving as between adjacent elements and this is significant, however small, in increasing the ratio of working area equipped with apertures to total area of a multi-element screen, and my screen elements have another feature contributing substantially to this.

Polymeric materials, such as polyurethane, used for moulding screen elements have substantial flexibility, a feature which, indeed, is believed to contribute to their surprisingly long working life. The screen elements thus require reinforcement at least at their edges, and especially where, as I prefer, pluralities of elements are interconnected together to make up screens or screen parts that are suitable for direct replacement of previous wedge-wire screen elements without the necessity for a special subframe. I have found that oblong screen elements to intercouple at their long edges are extremely satisfactory if formed with a major division of apertured area from long edge to long edge with an incorporated reinforcement following the edges and such division and fabricated from flat steel strip disposed within moulding parts depending from the apertured areas. Such very narrow reinforcement is very good for the purpose of maximising working screen area by minimising the width of reinforcement housing and, most surprisingly, further permits a screen element with quartering reinforcement of 10 mm x 2.5 mm mild steel strip and measuring 272 mm x 183 mm (ex interengaging edge parts) x 25 mm (reinforcing housing height) to be bent over its width to a radius of as little as 25 cm, say for the making of centrifuge baskets.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a plan view of one screening element from below;

Figure 2 is a section as A—A of Figure 1;

Figure 3 is a detail sectional view of edge intercoupling for adjacent screen elements;

Figure 4 shows the edge intercoupling in plan; and

Figures 5 and 6 show alternative reinforcings.

In Figures 1 and 2 an oblong screen element 1 comprises a moulding of polymeric material, specifically with peripheral edging 10, 12 at its long sides and 14, 16 at its short sides defining the overall height *h* of the element. Centrally between the long side edgings 10, 12 and between the short side edgings 14, 16 are full height ribbings 18 and 20, respectively, with that 20 between the short edges of greater width. The apertured working area of the element is thus quartered into four equal areas 22, 24, 26 and 28 each comprising a grating divided into three parts 30, 32, 34 by equally spaced thin ribs 36, 38 of less than the overall height *h* and parallel with the longside edgings 10, 12. Each grating part comprises parallel spaced screening bars 40 with downwardly convergent sides 42. These screening bars 40 define the screening particle size, resist blockage by their tapering and are also of very considerable flexibility.

The edgings 10 to 16 and ribbings 18, 20 house a welded-up reinforcing steel frame 50 fabricated from flat strip to minimise housing width requirements and thereby maximise apertured working screen area.

The long side edgings 10, 12 have outward spaced extensions 52, 54 in a castellated manner and staggered one relative to the other so that, for long side adjacent elements, the extensions 52, 54 snugly interfit. The extensions 52, 54 have channels 56 on them that comprise in section, see Figure 3, an inner part 58 and a relatively narrow outer part 60 to their undersides 61.

Elongate interlocking member 62 can be press-fitted through the channel outer parts 60 and into the channel inner parts 58 with, at least when fitted, close sectional correspondence of the interlocking member and the channel outer parts 60. This correspondence will, of course, normally be approximated as closely as possible in manufacture, but due to the resilience of the polymeric material, one-sided tolerances from nominal can be permitted, i.e. oversize for the interlocking member and undersize for the inner channel part.

The preferred cross-section of the inner channel parts 58 correspond to that of a wedge wire type interlocking member of which the section has convergent sides 64 from a flat relatively wide edge 66 and of initially constant slope towards its narrower edge 68 near to which the slope increases. This is readily forced narrow edge first into the channels, especially where, as shown, outer parts 60 are divergent sided though terminating at a spacing less than that of the wider wire edge 66.

Knocking-off of an individual screen element may be facilitated if the wide wire edge 66 has chamfered corners, or if the wires tapers from its largest width towards both edges, though not necessarily in the same way or to the same extent.

Extremely good close and positive interrelation of adjacent screen elements can be attained in this way.

The inner channel part cross-sections are oversize relative to the interlocking member. As shown in Figure 4, the inner channel parts 58 are offset as between the interengaging edging extensions 52, 54 to promote snug fitting, but the outer channel parts are maintained aligned so as not to create problems on insertion of the interlocking members bodily and narrow side on.

We have described reinforcing wire of wedge-shaped section and referred to the possible double tapering thereof. In fact, experiments have shown that a square-section reinforcement is a practical proposition, espe-

cially with a similarly shaped inner cavity 58' entered at one corner as shown in Figure 5. However, a rectangular rod for example of 3:1 aspect ratio, could be used with a corresponding inner channel cavity, but still to be forced in its narrow dimension, past a constricted channel entry, and maximises strength obtained for the weight of the rod. Just such an arrangement is shown in Figure 6 with an oblong cavity 88 shaped to fit a rod or bar 90 within a side lip 92, 92' of the intercalating channeled parts of the sieve elements. That most usefully affords such lips from alternating sides thereof along the length of the rod or bar 90 when snapped into place.

Claims

1. A screen element moulded from synthetic polymeric material having at opposed edges thereof outwardly spaced extensions (52, 54) in a castellated manner and staggered one relative to the other so that, with adjacent interlocation of two screen elements, the extensions (52, 54) snugly interfit, and the extensions (52, 54) comprising a channel (56 or 88) adapted to receive an elongate interlocking member (62 or 90) for securing adjacent screen elements together and the channel having an inner part 58, 58' or 88) within which the elongate interlocking member (62 or 90) is accommodated such as to make locating contact with the inner part at least at one side thereof when the screen elements are secured together and an outer part (69 or 92, 92') through which the elongate interlocking element (62 or 90) passes into the inner part (58, 58' or 88) and which is of less width than the elongate interlocking element (62 or 90) to permit snap-in fitting and retention thereof, the screen element being characterised in that, with the extensions (52, 54) of adjacent screen elements snugly interfitted and prior to insertion of the elongate interlocking element (62, 90), the outer parts (60 or 92, 92') of the channels (56 or 88) of adjacent extensions (52, 54) are aligned when the inner parts (58, 58' or 88) are offset.

2. A screen-element according to claim 1, characterised in that said outer part (60) is divergent sided towards said surface.

3. A screen-element according to claim 1 or claim 2, characterised in that said inner part (58) has its said one side conforming closely to a wedge-wire type said member.

4. A screen-element according to claim 1 or claim 2, characterised in that said inner part (88) has its said one side conforming closely to a square-section said member.

5. A screen-element according to any preceding claim, characterised in that the whole of the inner part (58, 88) corresponds closely with said member at least when fitted.

6. A screen-element according to claim 1, characterised in that the inner part (88) is of oblong section and the outer part is defined by a lip (92') on the inner side of the element.

7. A screen-element according to claim 5 or claim 6, characterised in that before fitting of said member, the inner part (58, 88) is at least to some extent undersize compared with said member.

8. A screen-element according to any preceding claim, characterised in that a moulded body (Figure 1) thereof is generally oblong for interlocation at its long edges (10, 12), and has a fabricated flat strip reinforcement (50) through all its four edges and at least any medial division of apertured screen area running between its long edges.

9. A screen module comprising a plurality of screen elements each as in any previous claim and interlocated by a said interlocking member or members.

Revendications

1. Un élément de crible moulé à partir d'un matériau polymère synthétique ayant sur ses bords opposés des prolongements espacés dirigés vers l'extérieur (52, 54) selon une disposition en créneau et étagés l'un par rapport à l'autre de manière que, lors de la mise en place adjacente de deux éléments de crible, les prolongements (52, 54) s'emboîtent d'une manière étroite, les prolongements (52, 54) comportant un canal (56 ou 88) adapté pour recevoir un élément de verrouillage allongé (62 ou 90) pour solidariser les éléments de crible adjacents les uns avec les autres et le canal ayant une partie interne 58, 58' ou 88) dans laquelle l'élément de verrouillage allongé (62 ou 90) est logé de manière à assurer un contact de positionnement avec la partie interne, au moins d'un côté du canal lorsque les éléments de crible sont fixés ensemble et une partie externe (60 ou 92, 92') à travers laquelle l'élément de verrouillage allongé (62 ou 90) passe pour pénétrer dans la partie interne (58, 58' ou 88), cette partie étant d'une largeur moindre que l'élément de verrouillage allongé (62 ou 90) pour permettre un emboîtement par encliquetage et une rétention de celui-ci, l'élément de crible étant caractérisé en ce que, avec les prolongements (52, 54) des éléments adjacents emboîtés d'une manière étroite et préalablement à l'insertion de l'élément de verrouillage allongé (62 ou 90), les parties externes 60 ou 92, 92') des canaux (56 ou 88) des prolongements adjacents (52, 54) sont alignées lorsque les parties internes 58, 58' ou 88) sont décalées.

2. Un élément de crible selon la revendication 1, caractérisé en ce que ladite partie externe (60) présente des côtés divergents vers ladite surface.

3. Un élément de crible selon la revendication 1 ou la revendication 2, caractérisé en ce que ladite partie interne (58) a un côté se conformant étroitement audit élément du type en fil de section en coin.

4. Un élément de crible selon la revendication

1 ou la revendication 2, caractérisé en ce que ladite partie interne (88) a son dit côté se conformant étroitement audit élément de section carrée.

5. Un élément de crible selon l'une quelconque des revendications précédentes, caractérisé en ce que l'ensemble de la partie interne (58, 88) correspond étroitement audit élément au moins lorsqu'il est monté.

6. Un élément de crible selon la revendication 1, caractérisé en ce que la partie interne (88) est de section rectangulaire et la partie externe est délimitée par une lèvre (92') sur le côté interne de l'élément.

7. Un élément de crible selon la revendication 5 ou la revendication 6, caractérisé en ce que, avant la mise en place dudit élément, la partie interne (58, 88) est, au moins dans une certaine mesure, sous-dimensionnée par rapport audit élément.

8. Un élément de crible selon l'une quelconque des revendications précédentes, caractérisé en ce que le corps moulé (Figure 1) de celui-ci est généralement rectangulaire et prévu pour s'emboîter par ses grands côtés (10, 12), et comporte un renfort (50) réalisé à partir d'une bande plate passant à travers l'ensemble de ses quatre bords et au moins une division médiane de la surface munie d'orifices du crible s'étendant entre ses grands côtés.

9. Un panneau de crible comprenant une pluralité d'éléments de crible, chacun selon l'une quelconque des revendications précédentes, mis en position par ledit élément ou lesdits éléments de verrouillage.

Patentansprüche

1. Ein aus einem synthetischen polymeren Material geformtes Siebelement mit zinnenartig nach außen gerichteten Vorsprüngen (52, 54) an gegenüberliegenden Seiten, die zueinander versetzt sind, so daß bei zwei nebeneinanderliegenden zusammengefügten Siebelementen die Vorsprünge (52, 54) satt ineinander greifen, wobei die Vorsprünge (52, 54) eine Rinne (56 oder 88) aufweisen, die geeignet ist, einen länglichen Kupplungsteil (62 oder 90) aufzunehmen, um aneinanderstoßende Siebelemente miteinander zu verbinden, wobei die Rinne einen inneren Teil (58, 58' oder 88) hat, in dem der länglich Kupplungsteil (62 oder 90) angeordnet ist, und dabei mindestens an einer Seite dem inneren Teil haltend anliegt, wenn die Siebelemente miteinander verbunden sind, und einem äußeren Teil (60 oder 92, 92'), durch welchen der längliche Kupplungsteil (62 oder 90) in den inneren Teil (58, 58' oder 88) gelangt und der schmäler ist als der längliche Kupplungsteil (69 oder 90) um einen Schnappsitz und Halt desselben zu ermöglichen, das Siebelement ist dadurch gekennzeichnet, daß, wenn die Vorsprünge (52, 34) aneinander anstoßender Siebelemente satt ineinander greifen, bevor der längliche Kupplungsteil (62, 90) eingefügt ist, die äußeren Teile (60 oder 92, 92') der Rinnen (56 oder 88) benachbarter Vorsprünge (52, 54) ausgerichtet sind, während die inneren Teile (58, 58' oder 88) versetzt sind.

2. Ein Siebelement nach Anspruch 1, dadurch gekennzeichnet, daß der äußere Teil (60 zur Oberfläche divergierende Seiten hat.

3. Ein Siebelement nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß die eine Seite des inneren Teils (58) eng dem Kupplungsteil, der keilförmig ausgebildet ist, angepaßt ist.

4. Ein Siebelement nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die eine Seite des inneren Teiles (88) eng dem Kupplungsteil, der mit rechtwinkeligem Querschnitt ausgebildet ist, angepaßt ist.

5. Ein Siebelement nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der innere Teil (58, 88) zur Gänze knapp dem Kupplungsteil entspricht, zumindestens wenn dieser eingesetzt ist.

6. Ein Siebelement nach Anspruch 1, dadurch gekennzeichnet, daß der innere Teil (88) rechteckigen Querschnitt hat und daß der äußere Teil von einer Lippe (92') an der inneren Seite des Elementes definiert wird.

7. Ein Siebelement nach Anspruch 5 oder 6, dadurch gekennzeichnet, daß vor dem Einsetzen des Kupplungsteiles der innere Teil in bezug auf den Kupplungsteil zumindestens etwas untermaßig ist.

8. Ein Siebelement nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß es einen im wesentlichen rechteckigen Gußkörper (Fig. 1) aufweist, der an seinen langen Seiten (10, 12) verriegelbar ist und einen flachen Metallstreifen als Verstärkung (50) in allen vier Kanten hat, und mindestens irgendeine mittlere Unterteilung dermit Öffnungen versehenen Siebfläche die zwischen den langen Rändern verläuft.

9. Ein Siebmodul mit mehreren Siebelementen nach irgendeinem der vorhergehenden Ansprüche, die mit dem Kupplugsteil oder den Kupplungstellen aneinander gehalten sind.

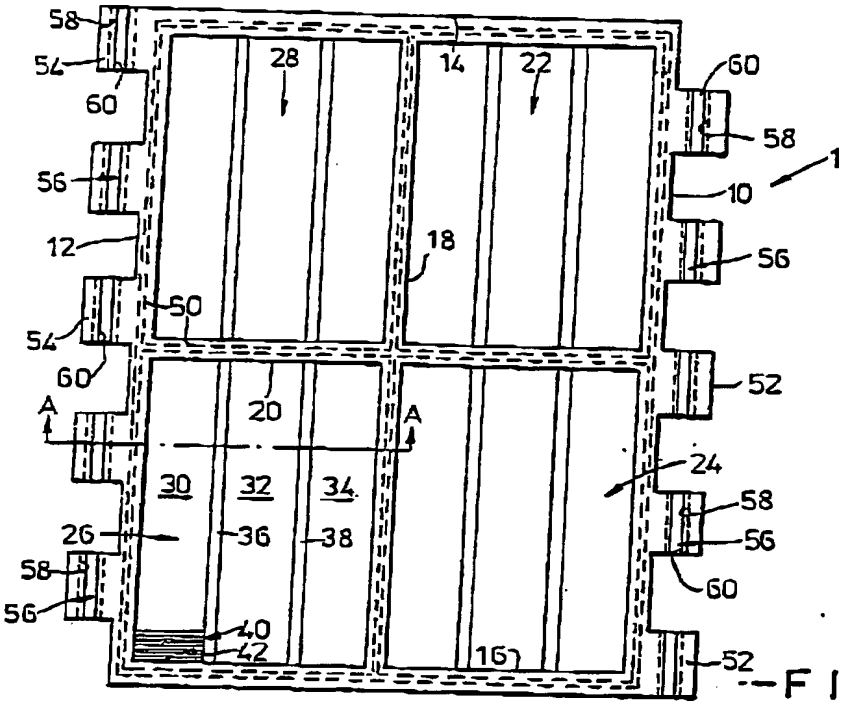


FIG.1

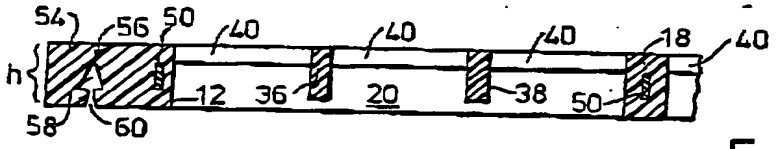


FIG.2

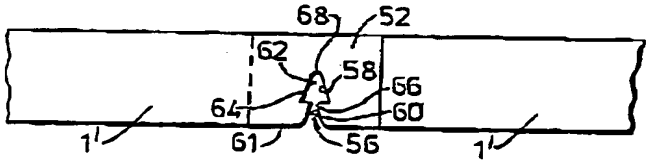
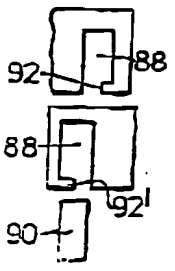


FIG.3

FIG.6



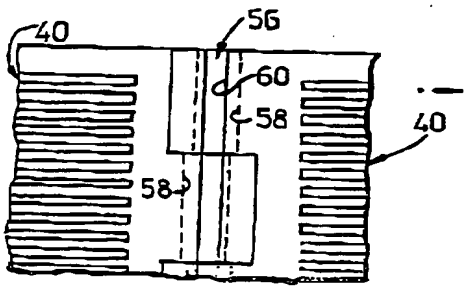


FIG.4

FIG.5